JOINT FORCES STAFF COLLEGE
JOINT ADVANCED WARFIGHTING SCHOOL

Balancing Strategy, Resources and Capability: Sizing the Force for an Uncertain Future

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A paper submitted to the Faculty of the Joint Advanced Warfighting School in partial satisfaction of the requirements of a Master of Science Degree in Joint Campaign Planning and Strategy

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

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14. ABSTRACT The thesis of this paper is: Given the historical pattern of U. S. post-war spending, the time period following Operation Iraqi Freedom and Operation Enduring Freedom (OIF OEF) will require adjustments to military programs that avoid the demise of core capabilities; these adjustments must be understood and applied. This situation, taken in conjunction with the utilization rates of our military equipment and people and the quantity and focus of training toward OIF and OEF, has left the military in a programming predicament not seen since the end of Vietnam. The research question to be answered here is this: assuming a repeat of these historical budgetary patterns, how can the US combat force best be reconstituted under zero growth in military spending? The methodology for developing this paper involved primary source budget documents, briefings, and speeches. Secondary source products included contracted studies on the topic, and opinion pieces from policy makers and pundits. Information gained from off the record interviews was not directly used, but shaped the course and emphasis of the research. The essential outcomes of this research are: DoD strategic guidance must be specific and prioritized, the research suggests that Defending the Homeland in Depth should be the prime directive from which the Services program. The Services must reprioritize programming based on this refined strategic guidance and the future budget reality of zero growth. Programs that have been at an enhanced level must be devolved by DoD to a basic level, rather than letting the legislature and budget realities control the situation. The research then uses the Joint Strike Fighter program to illustrate how this might be done, suggesting that a single model F-35J be fielded in conjunction with a FA-18J Super Hornet for all services as the most effective, efficient, and adaptable strike fighter capability for our nation's future.

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Abstract

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Special thanks to Charles “Chuck” Cunningham Lt Gen (Ret) for many hours of mentorship both on my thesis and as my 6300 seminar instructor, his time devoted to me helped in my understanding of the course content. His sage advice will be carried into the future by the author and many joint professionals. Dr. Gail Nicula’s assistance as a research librarian was second to none. Her help with research, and with keeping me upbeat when my motivation was low was a critical fact in my completion of this project. Dr. Keith Dickson’s help in organizing the structure and flow of this research was a key fact in improving the final outcome.

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COMMANDER DOUGLAS C. VERISSIMO

"V8"

UNITED STATES NAVY

Commander Verissimo, from Falmouth, Massachusetts, graduated from Falmouth High School in 1983. While working at his father's mason contracting business he enrolled at Cape Cod Community College and graduated with an Associates Degree in Arts and Science in 1987. After graduation, he was accepted into the Naval Aviation Cadet (NAVCAD) Program and reported to NAS Pensacola, Florida, for Aviation Officer Candidate School. Upon completion of flight training, he earned both his commission and wings of gold in July 1989.

CDR Verissimo reported to VFA-125 NAS Lemoore, California, for initial Hornet training. In June 1990, he reported to VFA-25, the "Fist of the Fleet," and immediately departed for his first deployment aboard USS INDEPENDENCE (CV 62). During this deployment, USS INDEPENDENCE operated in the Arabian Gulf as a spearhead for Operation DESERT SHIELD. His tour with VFA-25 included a short cruise to Hawaii, facilitating the retirement of the aircraft carrier USS MIDWAY (CV 41) and operations on USS CARL VINSON (CVN 70).

In December of 1993, CDR Verissimo left VFA-25 to complete his bachelors' degree. He attended California State University Fresno and earned a degree in mathematics in December 1995. CDR Verissimo then reported back to VFA-125 for refresher training in the Hornet, with a follow-on assignment as an instructor pilot. While with the Rough Raiders, CDR Verissimo was selected as a member of the United States Navy Flight Demonstration Squadron, "The Blue Angels." While serving with the Blue Angels, he served in the positions of Narrator, Opposing Solo, and Lead Solo.

In March of 2000, CDR Verissimo reported to USS JOHN C. STENNIS (CVN 74) as a Catapult and Arresting Gear Officer. During his tour, the ship participated in Operation SOUTHERN WATCH. In January of 2002, CDR Verissimo reported to VFA-34, the "Blue Blasters," for his next tour, serving as the Department Head in Safety, Operations, and Maintenance. During his tour, the squadron participated in Operation ENDURING FREEDOM and SOUTHERN WATCH.

In August of 2004, CDR Verissimo reported as Executive Officer of VFA-105, and assumed command in December of 2005. In March of 2007, he filled a post as the Executive Assistant to Commander, Naval Airforces Atlantic, and in July of 2007 began a year long course at the Joint Forces Staff College. He has accumulated over 4,000 flight hours and 535 Carrier Arrested landings. His personal decorations include 2 Meritorious Service Medal, 3 Navy Commendation Medals, and 2 Navy Achievement Medals.

CDR Verissimo is married to the former Amanda B. Garcia of Palacios, Texas. They have three children: Megan (17), Zachary (14), and Jon (13).

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Introduction

The people of our nation, with all of their strength, individuality and ingenuity, have historically been consistent with regard to their will to spend on military structure immediately following involved combat operations. The U.S. has had a significant downturn in military spending after every war during our history. After World War I, World War II, Korea, Vietnam, and the Cold War/Gulf War, the cyclical pattern has remained relatively constant. Operation Iraqi Freedom will be no different.

This propensity can be linked back to our founding document, "The Constitution". Our founding fathers were leery of maintaining a large standing Army. Compare how our founding fathers differentiated between the Army and Navy in this excerpt from the constitution granting legislative authority: "To raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years; To provide and maintain a Navy."[1] It is clear that the authors of the Constitution did not intend to maintain an Army, but would raise one when needed. This caveat did not exist for the Navy, as a Navy could not as easily be used against the fledgling government and the time to build ships was and is a costly and time consuming enterprise. In the revolutionary era, an Army was built quickly for war from the militia and National Guard, and was just as quickly dissolved after the fight had ended. This pattern has remained fundamentally constant from 1861 until the present: the complex forces stay activated between wars while the less complicated forces stand down after conflict.

[1] U.S. Constitution.

Throughout history, the American people have elected representatives who decrease overall military spending after a prolonged and costly military campaign. Due to this history, our military has attempted to predict the needed size of our standing military infrastructure, and what shape of force can best be expanded when more is needed. However, irrespective of what the military predicted in the past, when studying the change in budgets following wars, the shift in real dollars and dollars as related to Gross Domestic Product (GDP) is clear. Americans expect to spend less on military needs immediately after involvement in prolonged hostilities.

The thesis of this paper is: Given the historical pattern of U. S. post-war spending, the time period following Operation Iraqi Freedom and Operation Enduring Freedom (OIF OEF) will require adjustments to military programs that avoid the demise of core capabilities; these adjustments must be understood and applied. This situation, taken in conjunction with the utilization rates of our military equipment and people and the quantity and focus of training toward OIF and Operation Enduring Freedom (OEF), has left the military in a programming predicament not seen since the end of Vietnam. There is greater predictability in how the populace will deal with the withdrawal from OIF than in how our Services will program within the budgetary hand they are dealt post OIF. The research question to be answered here is this: assuming a repeat of these historical budgetary patterns, how can the US combat force best be reconstituted under zero growth in military spending?

The thrust of this research will focus on how the force must change in the way it is manned and equipped for the future as directed by the 2006 Quadrennial Defense Review. Just as there was a realization of a need for change after Vietnam, with regard to

dealing with the Soviet threat, the U.S. currently finds itself with legacy capabilities and capacities shrinking in relation to countering the future threats to our national strategic interests.

The methodology for developing this paper involved primary source budget documents, power point briefings, and speeches. Secondary source products included contracted studies on the topic, and opinion pieces from policy makers and pundits. Information gained from off the record interviews was not directly used but shaped the course and emphasis of the research.

This research will culminate with an illustrative case study of the Joint Strike Fighter (JSF) Program. This program is the largest weapons system currently in development; therefore, any growth or contraction in this program will have an effect across the entire DoD budget. Realistic and timely changes to the current JSF program will be a guiding example for other programs' potential for change. In conclusion, this paper will propose a prudent change in the JSF's current program course of action that might best utilize scarce resources, under a refined strategy, for optimal future readiness.

The goal of this illustrative case is to suggest prudent changes to our programming before the last shot is fired in our current struggle. "Victory is our first and only duty, but just as we prepare for war in a time of peace, so we should prepare for peace in time of war."[2] The following quote from General Donn A. Starry is as relevant today as it was in 1972: "Change is a constant for today's armed forces. With frequently shifting requirements as well as advancing technology, it is imperative that any reforms

[2] Bernard M. Baruch and John M. Hancock, *War and Postwar Adjustment Policies* (American Council on Public Affairs, 1944), 1.

contribute to a force's ability to operate on the battlefield."[3] Gen Starry and his team did a remarkable job in adapting to change; the incorporation of AirLand Battle across all Services was very successful. However, the change before us now is made more challenging by the complexity of the battlefield. The strategic end of Gen Starry's time was to protect Western Europe from the Soviet attack. Today's strategic end is difficult to define, and the battlefield or center of gravity of this current threat is abstract, but we do have the lessons from the past, we do not need to wait for twelve years to adjust to our fiscal reality. We can preemptively adjust to maintain readiness in a time of diminishing resources. Gen Starry's comments above, came four years after the draw down in Vietnam began, and ultimately developed into a winning doctrine by 1980. We must begin this conversation now before a draw down commences in order to make the most of the current situation.

In this uncertain strategic environment and given the near certainty of zero budget growth after OIF, the Services must focus on the age-old argument of capability verses capacity, while examining how to program the military of the future for the next 10-15 years. The time window of 10-15 years is used because it mimics historical reality when evaluating budget patterns. This paper will use reflections from our draw down post Vietnam linked to the budget expansion beginning in 1980. This twelve year period is viewed as a realistic marker for the populaces' and political will following involved combat operations. Additionally, the accuracy in predicting capability requirements for a future not yet know has limits beyond 10-15 years. This limit on accurate predictability must be considered when programming for an adaptable agile force structure.

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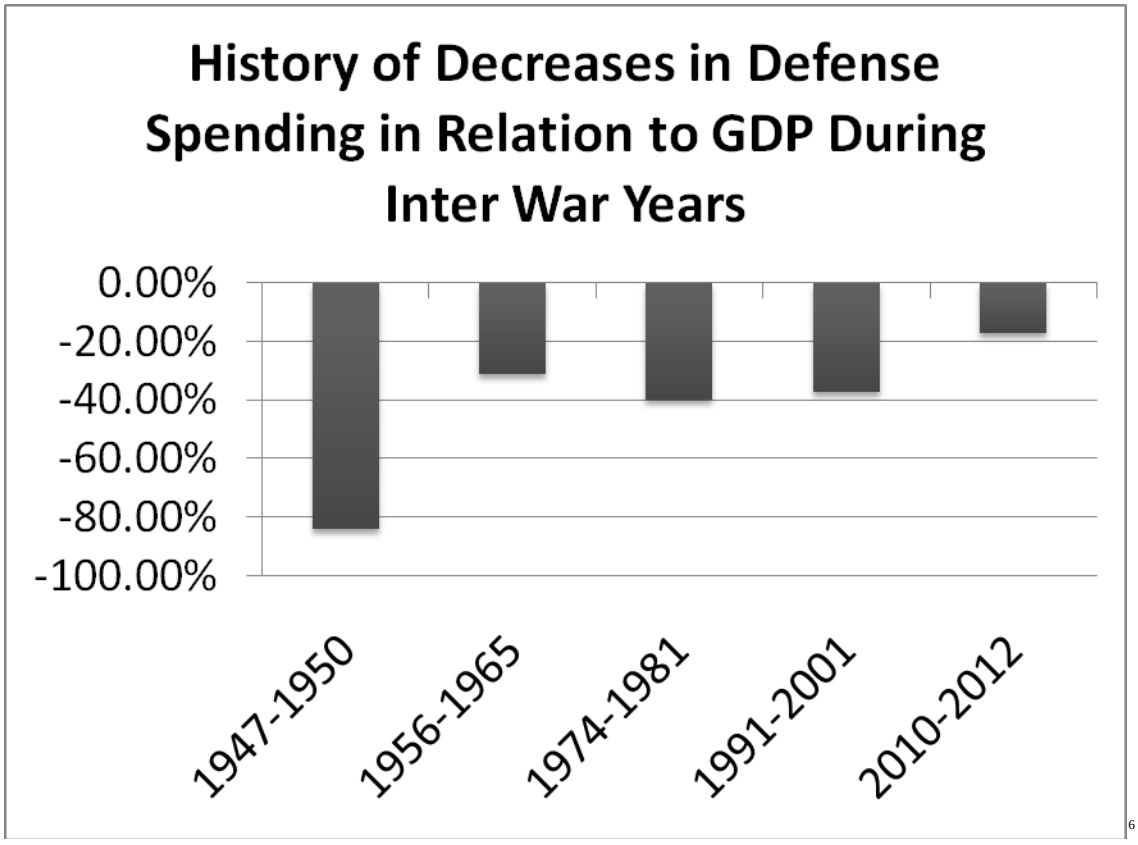
[3] General Donn A. Starry, To Change an Army, Military Review 1983, an article adapted from an address made by General Starry, 10 June 1982, to the US Army War College Committee on a Theory of Combat, Carlisle Barracks, Pennsylvania.

Whether military budgets are measured against normalized dollars or as percents of GDP, history has shown that the American people and their elected officials have decreased defense spending after each major military action. During the inter-war years following WW II, military spending as a percent of GDP, decreased by 84 percent. Post-Korea it decreased by 31 percent, post Vietnam 40 percent and post Cold War/Gulf War One 37 percent.[4] Does this past portend a similar occurrence in the future? One current budget forecast show a decrease in military spending in relation to GDP beginning in 2009; this forecast predicts a 17 percent decrease of the baseline budget without concrete knowledge of global military involvement.[5]

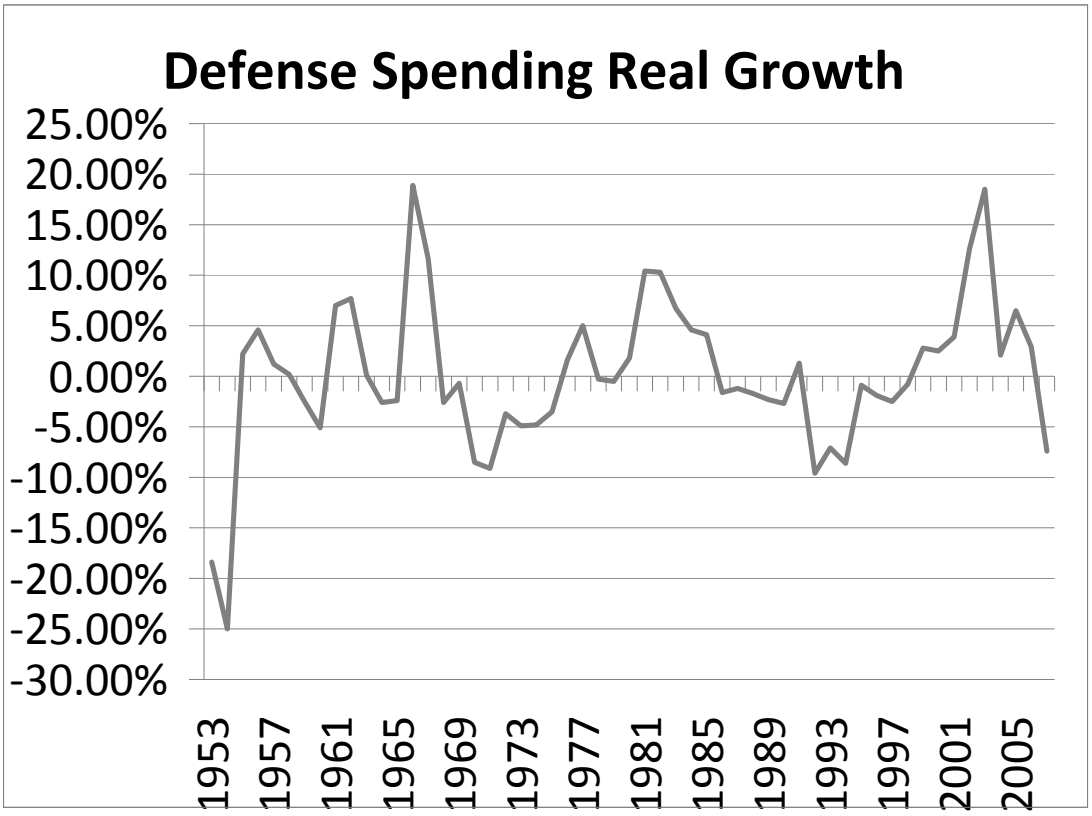


[6]

Figure 1 2010-1012 Data from CBO Estimates

[4] Congressional Budget Office, "The Budget For Fiscal Year 2008" , Historical Tables, 46-54
[5] Ibid. 54
[6] Data compiled by the author to show the percent decrease and duration of decrease during inter war year periods from "The Budget For Fiscal Year 2008" , Historical Tables, 46-54

For additional emphasis, listed below are examples of military spending using normalized 2008 dollars to highlight trends in real dollar spending. Real dollars, unlike GDP, are not influenced by national wealth. Real dollars are only adjusted for inflation and should provide a more direct correlation to the value of military programs, capabilities and capacity. When looking at real dollars one must remember a principle of interest: that a 50 percent loss can only be recovered by a 100 percent gain. Additionally, when using percent in real dollars, the rule of 72 applies. The rule of 72 states that when calculating growth, if you divide 72 by the annual growth you can quickly calculate the time it will take to double or halve the sum. As an example to clarify: a one dollar budget that grows at 10 percent will double to two dollars in 7.2 years.



[7]

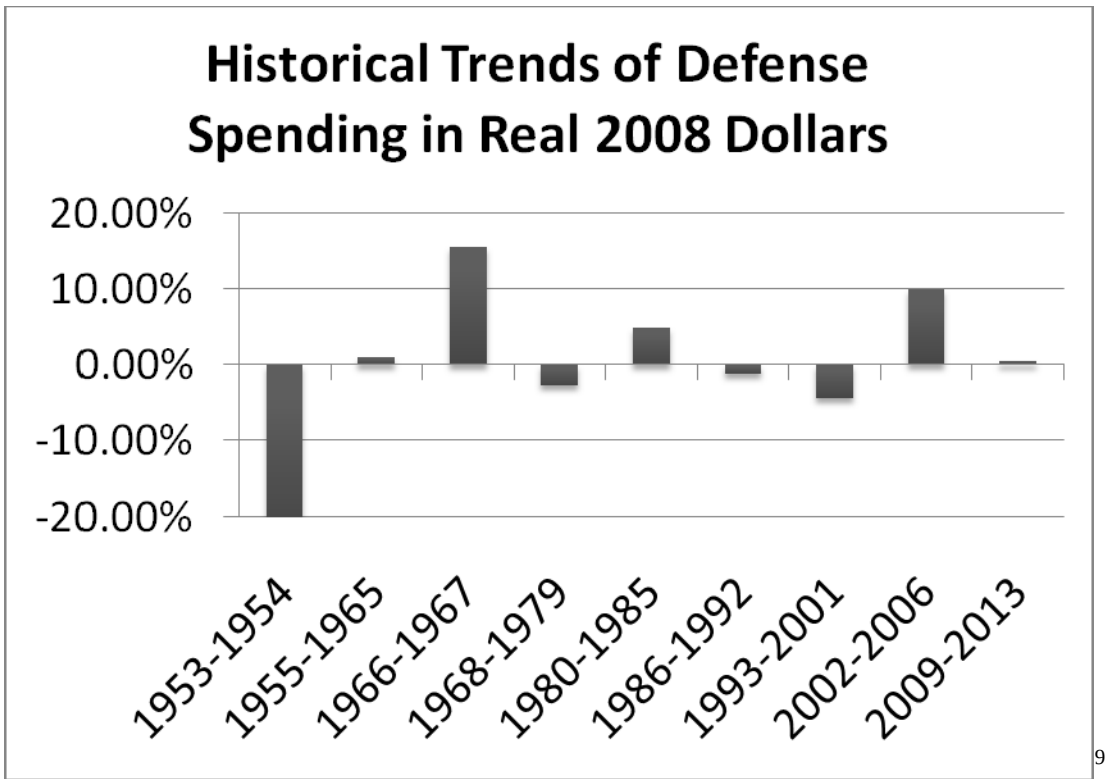
Figure 2

[7] Data compiled by author to show yearly real dollar budget trends from Office of the Under Secretary of Defense (Comptroller) March 2007, "The National Defense Budget Estimates for FY 2008, 140-145.

In 1951 and 1952 during the Korean War real military spending rose 142 percent and 31 percent respectively; in the two years after the war, military spending fell 18.4 percent and 25 percent. From 1955 through 1965, budgeted military spending remained relatively constant, rising an average of less than 1 percent annually. During 1966 and 1967, the years of expansion in the Vietnam War, military spending rose 18.9 and 11.6 percent. As public support fell and our military effort contracted, spending began to decrease: from 1968 to 1979, military spending contracted an average of 2.7 percent annually.

This eleven year period was followed by a new emphasis on countering the Soviet Union during the Reagan Pesidency. From 1980 until 1985, the average annual increase in military spending was 4.8 percent. During the next six years, spending contracted 1.3 percent. However, based on the previous increase, spending remained strong. After the collapse of the Soviet Union, the next seven years saw a marked draw-down of 4.5 percent annually in military spending. During the four years after the terrorist attacks of 2001, (not including the Global War on Terrorism supplemental,) baseline military spending went up at a yearly average of 9.9 percent. From 2009 until 2013 the forecast for military spending in constant dollars is to expand by an average of .5 percent,[8] in addition, the Global War on Terrorism supplemental is to expire by the start of fiscal year 2010.

[8] Office of the Under Secretary of Defense (Comptroller) March 2007, "The National Defense Budget Estimates for FY 2008, 140-145.



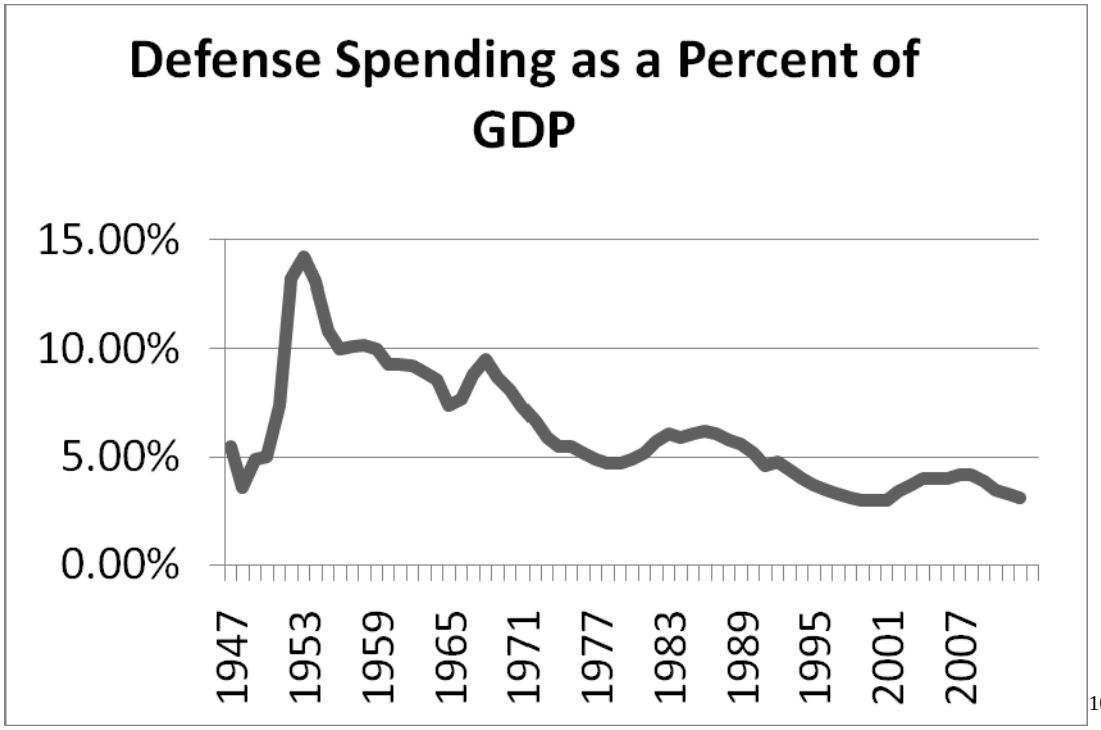
[9]

Figure 3

With the loss of the Global War on Terrorism supplemental, future real dollars projected to flow to the military will contract when measured against FY 08. Real dollars are not a perfect measure for calculating military programs, capabilities and capacity. Non-linear variables will be hidden in this measurement; changes in productivity and exaggerated inflation in some programs will hide or emphasize changes in spending. However, these non linear variables do not affect the measure of real dollar trends as much as the nation falling into and out of war. Real dollars is a viable method of measuring direct spending on military program capabilities and capacity. Given that these two different metrics for measuring military spending show identical cycles based on the nation's involvement in an OIF type large-scale combat operation, one must assume that without an additional (attack against our national interests), a similar pattern

[9] Data compiled by author to show the magnitude of budget growth and contraction and the duration of those periods from Office of the Under Secretary of Defense (Comptroller) March 2007, "The National Defense Budget Estimates for FY 2008, 140-145.

will emerge after OIF during the next Program Objective Memorandum (POM) budget cycle. From this data the assumption is that defense spending over the next 10 - 15 years based on GDP will be between 3.0 percent GDP and 3.5 percent GDP, and if measured in real dollars defense spending will remain flat.



[10]

Figure 4 2010-1012 Data from CBO Estimates

These fiscal realities are not currently calculated into the current POM and the individual Service programs. One counter-argument is that the data above is skewed by the strong growth of GDP. One must concede a long-term contraction of military spending in relation to total GDP has occurred. However, during each war this contraction has inverted; additionally, non-discretionary spending as a percentage of the budget has grown to fill the void left by this contraction in relation to GDP. Off-budget

[10] Data compiled by the author to show long term decreasing trend in defense spending in relation to GDP and to show the inversion of that trend during years of involved combat operations, from "The Budget For Fiscal Year 2008" , Historical Tables, 46-54

spending in real dollars has expanded by approximately 42 percent during the past fifty years. All predictions of future off-budget and non-discretionary budget spending forecasts pronounced growth as the nation copes with the aging baby boomers. These facts counter the assertion that military spending in relation to GDP has contracted too severely, and that military spending can and should expand to double digit percentages of the GDP.

Some who argue that budgets will continue to grow after OIF emphasize that any draw down of forces in OIF does not signify the end of the war, that this war is a Long War, and is global in nature. According to this argument, the combat in Iraq is but a battle in this Long War. This vision of the current struggle argues against a budgetary contraction post-hostilities. But without the support of the legislature and the people, the likelihood that spending will support our military to fight this Long War as envisioned in the Service's current programming model is unlikely. There is no certain future for military spending when one considers the open, complex system of American politics, there is a possible future where military spending will increase. More importantly, history shows that if the American populace perceives OIF as a war, and believes that war is over, then they will expect a decline in military spending as the nation returns to peace, despite what the pentagon says.

The following view from "The American Conservative", a magazine that most would describe as possessing a hawkish point of view, should be considered when predicting the public's will to fight and spend without additional provocation after OIF: "Despite all the propaganda about Islamofascism and the coming caliphate, Americans do not see the war

in Iraq as an existential crisis. They do not want to lose the war but are unwilling to pay a much higher price in blood and treasure to win it."[11]

As the plan for future military programs develops, it is unrealistic to hope the American people will fund military programming at today's levels. Doing so induces risks that might have far more negative effects than those induced by planning for less with the capacity and agility for much more. The Defense Department must find a way to build capabilities and capacity under predicted fiscal conditions to counter the expected threat for the next 10-15 years. A Nobel Prize winning physicist Ernest Rutherford stated "We haven't got the money, so we've got to think."[12]

U. S. strategic military vision, planning and implementation are found in the Future Years Defense Program, Program Objective Memorandum, and Quadrennial Defense Review (QDR). These works define the ends and ways of our future strategy; and the fiscal means to support that strategy.

The Department of Defense is operating under broad strategic guidelines. It is likely that this broad guidance will remain in place over the next two years leading up to 2010. As indicated previously by historical trends, the defense budget will stop growing and it will likely contract starting after 2010. This contraction and the current programming inefficiencies will hamper the ability of the individual Services to provide the capability to support the broad strategic guidelines as these inefficiencies, which are less impactful during a time of budget growth, are unacceptable under a contracting budget.

For the purpose of this paper, the budget and strategic guidance are considered constants. This is not to say that the military has no influence over these constants;

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[11] Patrick J. Buchanan, "Losing the Will to Fight, *The American Conservative*, 9 October 2006,
[12] Thinkexist.com, http://en.thinkexist.com/quotes/ernest_rutherford/, 10 March 2008

however, once the military's influence over these factors is complete, the final decision on the budget and strategic guidance are made by national command authority. It is up to DoD to develop the ends and ways of a military strategy to utilize the budget that fulfills the strategy. Additionally, these constants will trend in some specific direction for a length of time, and that must be accounted for by our Services in their programming. Therefore, the Services' capability portfolios are considered the independent variable and the Services' ability and willingness in order to change the capability portfolio is considered the dependent variable that must be manipulated by DoD to field the most effective, efficient and adaptable force to support the strategy for the next 10-15 years.

Given the historically predictable budgetary future, the military must be willing and ready to change its current capability portfolio and programming to fulfill the shift in strategy. This change must be done in a timely fashion and in a manner that adapts efficiently and effectively balancing capability, capacity and human capital.

The Danger of Vague Strategic Guidance

As implementers of the nation's strategic course, the military and Service are responsible for informing the executive and the legislative branches of its ability to accomplish a given strategic end state by providing some gross calculations of what it will cost. This is not what is occurring today. Current strategic guidance is very broad and does not specifically prioritize which programs need to be emphasized, to meet the strategic ends. Therefore, the Service chiefs today are unable to prioritize programs toward specific capabilities and capacities to fulfill the strategic guidance. This leads to the Services attempting to cover every requirement, programming more than they are resourced to accomplish, causing them to ask for additional budget resources.

The nation's strategic military direction as provided by the executive branch is summarized in the 2006 Quadrennial Defense Review. The QDR currently directs the Services to shift focus from today's capabilities in the traditional warfare realm toward the irregular, catastrophic and disruptive realms. Moreover, the Services are directed to shape the future force (in order of priority) to meet the needs of homeland defense, the war on terror/irregular warfare and conventional campaigns.[13]

Consider the budget programming necessary to meet the needs of the current strategic guidance. At first glance, this appears to be focused guidance. But as this guidance is broken down, impossibly vast requirements of the strategy begin to become apparent.

The programming decisions of the Services have been further complicated by statements by the Secretary of Defense which reorder and redefine priorities. For

[13] Office of the Secretary of Defense, "Quadrennial Defense Review 2006"

example this summary taken from a February 2006 press briefing is a list of capabilities that the Office of the Secretary of Defense has targeted as being needed for the future strategic needs of the U.S. This list consists of four topics, defend the homeland; defeat terrorist networks; countering WMD; and shaping choices.[14] Although similar, these four topics do not match the four capability areas. Later in the briefing, these four topics are further broken down into thirty two subtopics. These subtopics are not prioritized, and each of these subtopics will require multiple costly programs to fulfill each capability required by The Office of The Secretary of Defense.[15]

This example is but one of many briefings from higher authority related to the strategic guidance for the future military force shape. They highlight the problem of current strategic guidance. This unfocused and un-prioritized guidance forces Services to expand budget requests, rather than assess future capabilities against strategic priorities. As each subsequent command attempts to operationalize this strategic guidance, more complexity is added to the problem. Strategic guidance from higher authority must be specific and targeted toward one or two top priority ends; if not refined by the higher authority, the strategic guidance produces capability requirements that, if not immediately prioritized by the Services, overwhelm the means the Services have on hand, and the means required in the Services' future budgets.

The subordinate document that should begin the operationalization of the QDR to its next level is the National Defense Strategy (NDS). The current NDS was published before the QDR; therefore, it is superseded by the newer version of QDR. The NDS of March 2005 is a short document, and although it shares many themes with the QDR it has

[14] Office of the Secretary of Defense, "Quadrennieal Defense Review Results" 3 February 2006
[15] Ibid.

no specific prioritization identifying what capabilities will be required for the future force, nor does it discuss balancing the strategy against declining resources. The desired capabilities and attributes listed in the NDS list eight key operational capabilities and two attributes, but these capabilities and attributes are not linked to the QDR's requirements highlighted above.[16] This creates another layer of ambiguity for the Services as they struggle to meet broad and vague strategic guidance.

The next step in operationalizing our strategic guidance is accomplished through the National Military Strategy (NMS). As with the NDS, the current NMS was published before the QDR. This strategic document shares little in the area of vocabulary and terms used by the current QDR. The draft NMS appears to be intended to operationalize the current QDR. The draft has five areas of vital national interest, five capability areas to size and shape our military, and seven strategic challenges.

To summarize the broad range of topics and capability in the current strategic guidance that are to be made operational under constrained resources through the programming process: there exist four capability areas and three priorities for the future force from the 2006 QDR; four topics and thirty-two subtopics from the Secretary of Defense's office; eight key operational capabilities and two attributes from the NDS; five areas of national interest, and five capability areas to size and shape future force to meet seven strategic challenges from the draft NMS. Although much of the language in the guidance documents is similar, there is no overall structure or order, nor is there any priority action.

Because this study treats the strategic guidance as a constant, once published, by higher authority, the Services must make this guidance operational. The strategic

[16] The National Defense Strategy of The United States of America. March 2005. 12-16

guidance clearly is overly broad, and assigns more tasks for programming than the Services can provide. Yet, the Services appear to be trying to field programs to cover the entirety of the strategy without linking specific programs to specific strategic capabilities. This gives the appearance that the Services are continuing to program as they have with a relatively robust wartime budget. Strategic risks must be highlighted and priorities developed to support far more limited strategic ends.

It is essential, that every effort be made to rebalance Service programs with strategic guidance. All programming decisions must be made with an accurate and realistic estimate of the resources available. If this is done, the Services will be able to fulfill strategy through prudent programming. Developing a strategy without consideration of the means available to fulfill the strategy, will result in Service programming that attempts to fill all needs beyond the resources allocated. This most likely will result in the wrong systems being funded, and a military force unable to defend the nation's interests.

In contrast to the current collection of un-prioritized and vague strategic guidance, the strategic guidance post-Vietnam was clear, concise and established specific priorities for the Services to begin programming budgets for the following 10-15 years. Once given a prioritized strategic direction, the Services were able to program capabilities under their individual core competencies to fulfill the strategy. The number one priority of that guidance was to improve the U.S. military capability to defend Western Europe and South Korea from Soviet aggression.[17]

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[17] First Lieutenant Martin J. D'Amato. "Vigilant Warrior," Armor May June 2000. This journal article expresses how change occurred and took shape. This environment that required this change was caused by many factors, but the one which is described clearly throughout is countering the Soviet Threat in Europe and Korea. It shows how the strategy influenced doctrine and how doctrine influenced weapons systems.

Out of this guidance came a programming effort that supported an operational methodology known as AirLand Battle. Under this methodology, the Services were able to build their long-term budgets to meet the overall strategic direction and established priorities of the Secretary of Defense. The success of the methodology and doctrine know as AirLand Battle was proven in both the restructuring of U.S. military capabilities under programming and administration, and in its decisive role in military campaigns from 1989 to the present.

The AirLand Battle methodology could only be created through the foundation of clear strategic guidance which allowed the Services to prioritize the sequencing of programs for the future. Although, undoubtedly like today, there were many competing programming priorities, but unlike today, the foundation of a clear hierarchy of priorities was established. The requirement for clear guidance is more important today than it was then. Unlike 1980, after the reduction in post Vietnam era had happened, where a shift in strategic priorities led to increasing budgets, 2010 will likely require a strategic shift under constrained budgets.[18]

Strategic guidance needs to be clear and concise with one capability that must be pursued above all others. "Defending the homeland" is highlighted in nearly all strategic guidance as the nation's number one strategic interest.[19] Defending the open complex system that is our homeland requires creating more than a defensive force. It requires a force that is able to defend the homeland in depth. Defending in depth implies anticipating the capabilities for sufficient reach and mass, and the synergy and efficiency

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[18] Data compiled by author from Office of the Under Secretary of Defense (Comptroller) March 2007, "The National Defense Budget Estimates for FY 2008. 145.

[19] Nation strategic guidance publications list defending or guarding the homeland from attack first as they list elements or planning constructs. It is the authors assertion that this concept should be expressed with the same language in all guidance, with clear priority that homeland defense be first among all concerns.

of a joint interdependent force that can be configured for a variety of contingencies against a variety of threats to our homeland. This force must be adaptable to be of use in other lesser strategic requirements, but first and foremost it must be designed to defend the homeland in depth.

The above fundamental framework would make certain that when tough choices in resource allocation need to be made, unambiguous links can be related to specific higher strategic guidance.

Current Service Programming and Priorities

Vague strategic guidance has resulted in a broad-base response by the Services. Let us examine the programs in the military procurement budget that have an annual allocation of more than one billion dollars, and look at how the funding of these programs has changed from last fiscal year to the current. The age of the programs below vary from over ten years to less than two, but all reflect (or should reflect) the capability goals of the strategic guidance.

Program	**2008 Budget request**	**Change, 2007 to 2008**
Missile Defense	$8.8 Bil.	-6.2 percent
F/A-18E/F Hornet	$2.6 Bil.	-13.5 percent
Virginia class submarine	$2.7 Bil.	-1.1 percent
Future Combat System	$3.7 Bil.	+8.1 percent
C-130 Tanker	$1.6 Bil.	+7.3 percent
Space-Based Infrared System	$1.1 Bil.	+59.9 percent
EA-18G Growler	$1.6 Bil.	+56.4 percent
Evolved Expendable Launch Vehicle	$1.2 Bil.	+33.8 percent
Littoral combat ship	$1.2 Bil.	+30.4 percent
MH-60R/S	$1.6 Bil.	+3.9 percent
Stryker	$1.2 Bil.	+29.6 percent
San Antonio class amphibious transport dock	$1.4 Bil.	+263.5 percent
V-22 Osprey	$2.6 Bil.	+23.9 percent
F-35 Joint Strike Fighter	$6.1 Bil.	+23.0 percent
DDG 1000 Destroyer	$3.5 Bil.	+2.7 percent
Chemical Demilitarization	$1.5 Bil.	+16.6 percent
F-22 Raptor	$4.6 Bil.	+15.0 percent
Carrier Replacement Program	$3.1 Bil.	+117.7 percent[20]

[20] Office of the Secretary of Defense, "Program Acquisition Costs By Weapon System" available from http://www.defenselink.mil/news/Feb2006/d20060203qdrslides.pdf. 3 March 2008

These programs are important to the Services, and play specific historical roles in national defense. But in addition to taking to long to field, are they the right programs for an interdependent, joint and whole-of-government approach to what should be the clear strategic guidance of capabilities for defending the homeland in depth? Clearly, when programming to defend the homeland in depth one would ask, from who or what. We must be able to defend the homeland in depth from those who oppose us in the war on terror, from a belligerent peer, from pandemic flu, or from a threat we do not, and cannot, know exists at this time. This open complex system is difficult enough to program for, this is precisely why having a prime direction is so important to link multiple top line strategic focus areas together without priority quickly produces a system of systems that is unwieldy.

It is clear at the present that the most costly programs remain focused toward traditional conflict, with significant growth in programs that apply to an enhanced air and sea-power capability.

Research by others on this topic illustrates a similar observation:

- U.S. forces are still designed largely for conventional war in an era of asymmetric war and terrorism.
- The United States has an inflated basing and infrastructure from the Cold War era and many support and administrative elements that are overstaffed. This posture is probably around twenty percent too large.
- The National Guard and Reserves are tailored for a mix of quick-reaction missions, Cold War contingencies, and a total force concept that assumed they would not be deployed in these cases.
- The Army is designed to fight past conventional wars and, as such, far too few elements are suited to counterinsurgency and stability operations or rapid deployment. The Army has to draw on elements of only seventeen brigades for Iraq out of total of thirty-three.
- The Marine Corps has been optimized into nonlittoral missions and has gone lighter and lighter for other missions to maintain the size of its active force structure.

- A past focus on air and missile power, "effects-based" precision strikes, has pushed the Air Force and the Navy toward destroying regular military forces and fixed facilities.
- The Guard and the Reserves have been integrated in the "total force" for political reasons without adequate analysis of the resulting expeditionary impact.
- There is no matching deploying component in the civil agencies to support nation building and stability operations. They have civilian elements with little or no operational strength for such missions, and many of their personnel cannot or will not deploy into high-risk areas.
- There are major shortfalls in language and area skills, police-like forces, and civil-military units in a world where regional and asymmetric conflicts in non-Western areas are likely to be the rule, rather than the exception.[21]

With the likelihood of a defense budget with zero growth, and with unfocused strategic guidance, these current capabilities try to counter as broad a range of threats as possible. By budgeting for everything, the Services increase the risk of failure when the budget actually decreases. To make these changes, capability areas that were at minimal or basic levels will need to grow to enhanced levels, and areas that for fifty years have been enhanced levels will need to devolve to minimal or basic levels.

Thus far, the discussion of programs in this chapter has focused primarily on equipment. But a more important aspect of programming is the manning of that equipment. The current combat environment is affecting the individual Services in different ways. The Navy and Air Force, who are more equipment oriented, and were not easily converted to counter-insurgency warfare, have kept their programming focused on traditional combat areas. They are willing to cut personnel strength in order to preserve and modernize capabilities that are aligned to what their Services think are important in their core competency for the future. This slow recognition for the need to change will

[21] Anthony H. Cordesman with the Assistance of Paul S. Frederiksen and William D. Sullivan: *Salvaging American Defense: The Challenge of Strategic Overstretch:* (Center for Strategic and International Studies, 2007), 223

delay the ultimate need to reprioritize for the future; it will produce wasted efforts in programs that have been overcome by time and shifting priorities.

Superior systems are desirable, but not an automatic guarantee of victory. It is the force's ability to work in a seamless, coordinated fashion that defines greatness. Great strides have been made in our Services becoming a joint interoperable and interdependent force. This trend must not slow, in fact during a time of diminishing resources, we must accelerate this ability to work in a seamless, coordinated fashion so that we can save our individual core competencies. In addition to developing joint equipment, the nation must posses the trained human capital in sufficient numbers to fight the future wars while simultaneously training their replacements.

Here is the result of the lack of clear strategic direction: The Services have programmed for nearly every major weapons system possible to meet the un-prioritized strategic requirements set by DoD. As a result, the Services are trying to afford these new systems by taking actions to cut expenses in accounts other than acquisition.

While fighting the current war, both the Navy and Air Force have implemented a strategic course of recapitalization, saving money by cutting people to help pay for small numbers of very expensive equipment. Remember, programs are not just hardware; they consist of the infrastructure required to employ a capability. For emphasis, consider the summary of Gen T. Moseley's comments on our current course of action taken by the Air Force on the subject of recapitalization: Moseley said, since operations, maintenance and infrastructure accounts are tapped out. The Air Force calculates it would save $1.5

billion for every 10,000 airmen trimmed, and plans to trim 40,000 slots by 2009. That would cut the force to 316,000 airmen."[22]

While the Air Force and Navy are reducing manning to help to pay for future systems, the Army and Marine Corps are growing their manpower accounts.

Because the Army and Marine Corps have the brunt of the current fight, both have needed to expand their personnel numbers. However, both ground Services are being expanded by the legislature beyond the level they asked for and the majority of their combat forces are performing missions not in their traditional core competency. As involvement in OIF and OEF decrease, the increasing number of personnel assigned to the two ground components will impact their ability to fund, equip and train the organization to fulfill future needs. If not well thought out, the cost of supporting this large force after demobilization, may catch the individual Service off-guard and ultimately affect all of DoD's ability to recapitalize. This article from Senator Lieberman and Gen George W Casey Jr. on the Senate Armed Services Subcommittee's discussion of troop strength helps explain the dilemma:

> "This year, one of the most consequential issues confronting the Congress is increasing the size of the U.S. ground combat forces. While there have been attempts for several years to increase the force size, including a bill submitted by Senators Clinton, Reed, Salazar and myself to increase the Army by 100,000, until recently the Army has resisted, concluding that a temporary manpower increase of no more than 30,000 to permit conversion to brigade combat teams suffices, and that in due course the Army could then revert to the permanent end strength authorization of 482,400. To support this argument, the Army asserted that it could "find" enough additional manpower for this temporary increase by significantly decreasing uniformed positions in the institutional Army by as much as 60,000 and handing their duties to contractors. Many people were

[22] Greg Grant, Desperate for money, "The Government Executive". Vol. 39, Iss. 20, 15 Nov 2007, 35

> skeptical that this was possible or desirable. Those questions are now moot because the President has proposed a permanent active Army end strength increase over a five-year period to 547,400. This is clearly a step in the right direction, but there is really little on record to enable us to decide if that is the right number or the right schedule. Many believe it will not be enough. Some are concerned that the Army may not be able to recruit, train and equip the envisioned force on that schedule and within the budget that is proposed. Some doubt that the Army can attain and maintain the increase without substantially lowering the quality of personnel."[23]

When evaluated in the context of a complete interdependent interrelated force, individual Service plans are not being synergized with each other to provide the ways required to facilitate even a possible clear strategic end, especially when one considers the probable means for the next 10-15 years. In growing an interdependent force for the future, it is not ideal to have individual Service forces that grow and contract independent of each other without affecting one another directly. A growing ground force that is not supported by growth in sea and airlift capability is not strategically defensible.

An additional problem with controlling programming and military budgets comes directly from Congress. While attempting to fulfill a vague strategy under individual Service priorities for legacy systems (with questionable cost estimates), Congressmen occasionally step to and modify the Services' existing plans. This recently occurred in a discussion over Virginia-class submarines, with PA Democrat Rep John Murtha arguing in favor of expansion of Virginia-class submarine production over the Navy's objection.

> "With Pentagon outlays running at about $530 billion a year, you might not think it would be hard to add an extra $3 billion a year for another submarine. That's only about one-half of one percent of the Defense Department's total annual spending. But Work said the Navy is worried that Murtha's push for accelerated shipbuilding "will upset their long-term plans." A 33-year House veteran, Murtha was Nancy Pelosi's campaign

[23] Joe Lieberman, George W Casey Jr. "Senate Subcommittee Seeks to Boost Troop Strength," *Army*, June 2007, Vol. 57, Iss. 6, 14

> manager in her leadership battle with Steny Hoyer in 2001; she's speaker today due more to Murtha than to anyone else. But, said Work, "No matter how powerful you are, there's no way to have a guarantee that you're going to be able to sustain extra (shipbuilding) money over time. The Navy's plan is based on what they believe is sustainable over a 30-year period." [24]

The addition of a three billion dollar system, though representing less than one percent of the total defense budget is a much larger portion of the overall budget of the Navy. This late notice change or proposed change in the Navy's programming priorities causes havoc across the existing Service priorities. Does adding more rapid production of Virginia-class submarines to the fleet support strategic requirements? The answer here is uncertain. Without clear priorities, Congress can interpret the current vague strategic guidance along their area interest just as the Services do. This vague strategic guidance foils the ability to resolve differences through logical discourse.

This research has shown that beginning during the next budget cycles (2010) budgets are going to decline from current levels.[25] The current strategic guidance is broad and unfocused; therefore, it assigns no specific priority to those who are charged with making operational that strategy.

In this environment, the Services have responded in divergent and disjointed ways: First, they attempt to program for everything to fulfill this vague strategy, they do this under questionably optimistic costing data, money is shifted under secrecy to avoid highlighting problems. Under this system with vague strategic guidance, the Navy and Air Force have chosen to cut personnel in attempt to hold on to costly programs while the

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[24] Tom Curry, "Murtha Wants Full Speed Ahead on Submarines" MSNBC, available from http://www.msnbc.msn.com/id/17986643/.html; Internet; accessed 2 April 2008.
[25] Data compiled by author from Office of the Under Secretary of Defense (Comptroller) March 2007, "The National Defense Budget Estimates for FY 2008, 145.

Army and Marine Corps increase manpower beyond what many in those ground Services recommended for the near future.

Lack of strategic priorities and questionable Service programming behaviors allow congressional meddling to support programs that benefit the regions of those in power; rather than those that support an unambiguous strategy. These factors if not corrected, will leave the nation's military readiness in a predicament of misdirected priorities in a contracting budget environment; change must occur now in order to arrest this trend. There are events in our past when we have made these tough choices in a timely way, if we choose not to make those same sacrifices now we will find ourselves producing a hollow force ill equipped for the events of an unknown future.

A Hollow Force Avoided

There are probably few terms that inspire a more negative emotion for a military professional than “hollow force.” While researching the historical budget patterns of the interwar year periods, this term is often used to describe the condition of U.S. military forces during military budget contractions. The characteristics of each hollow force were different from the others, but in every case the connotation associated with the term hollow force was negative. A decline in defense spending does necessitate a decrease the mass of the force, but this decrease does not necessitate a unilateral cutting across all programs; only carful consideration of downsizing in specific areas is executed. Some capabilities must be made less ready, but they must be left in a condition where they can be made fully ready in time when needed. In this downsizing, extreme care must be taken when eliminating capability, it is the capabilities that are eliminated that are most costly to restore should there be a need of them. Skills that are lost or nearly lost are what will hollow a nation’s force. Because strategy does not provide refined guidance and Services have made unrealistic programming decision on the cusp of a decreasing budget, there exist the real possibility of a hollow force.

It is unrealistic to believe that during a time of peace the American public will be willing to spend the capital to field a force that possesses an enhanced capability and capacity to cover all facets of a far too broad strategy, individual Service priorities and political expediency. The Defense Department must review its spending program by program in order to field a minimal, basic, or enhanced capacity and capability to counter the threats as outlined by the finite strategic vision that is called for above. The Defense

Department must stay with terminology that is understood by our military members, treating the creation of programs to counter specific threats as objectives in the campaign plan of protecting our national security. Finally, the Defense Department must prioritize objectives, then determine the best course of action to achieve the desired end state, while managing the overall risk.

Utilizing this "campaign plan approach" and targeting capabilities and capacities to field a minimal, basic or enhanced program based on the threat, end state and risk with known fiscal limitations in a finite strategic framework would allow for a viable operational plan to take shape. Programs to counter a specific threat cannot be pursued in isolation, instead, the entire process of identifying enhance, basic and minimal capabilities and capacities must be completed prior to breaking ground on specific capabilities. Identifying what programs need an enhanced capability is an imperative. These programs need to mitigate critical risks and should be funded with depth, reach and emphasis, but not at the total expense of the programs that are identified as needing basic or minimal capabilities and capacities. These less-crucial capabilities might not be the key to security today, but could be the programs that shift to an enhanced emphasis should the winds of change come upon us.

While designing the future force, what is most important is not how we program an enhanced force. Military professionals are very good at that, and if put in charge of a program inevitably find a reason to advocate the program's expansion. The most important mission is how we design the basic and minimal forces. These programs must be meticulously designed and implemented. They will not be the most important

programs identified for our immediate national defense, and therefore are easily reprogrammed to fund what is most important today. This is one of biggest problems in how we do business today and is the path to creating a hollow force. These minimum and basic forces are not what is deemed to be most needed in the present, but must instead be the foundation for a possible future. We currently try to build everything as an enhanced program, but end up with diminished capability and capacity. This thought is well expressed by others as follows:

> "These problems have been compounded at both the military and civilian levels by the advocacy of given transformational concepts and technologies, which cannot be implemented at anything approaching their planned cost, planned time, and planned effectiveness. The progressive downsizing of virtually every program to fit real-world cost constraints, the constant downward reevaluation of what levels of performance and capability can actually be achieved, and equally constant delays in program execution have virtually ensured that the Department cannot execute its plans even when it has them."[26]

If the practices as outlined above continue under the conditions of a zero growth budget and broad strategic guidance, we will find ourselves with a hollow force.

The focus of our Service's procurement processes must be on highlighting where capabilities will not cover strategy, we must then communicate and adjust to these shortcomings, perhaps by changing strategy while guarding against creating more risks in the process. This must be accomplished under the assumption of zero growth in defense spending; therefore, to make these changes, some existing programs must be downsized in conjunction with the adjustment and employment of the other instruments of national power. Equipping and manning the future force requires key enablers, the two most

[26] Anthony H. Cordesman with the Assistance of Paul S. Frederiksen and William D. Sullivan: *Salvaging American Defense: The Challenge of Strategic Overstretch:* (Center for Strategic and AInternational Studies, 2007), 213

important being clear strategic guidance and a joint effort that facilitates the ends of that strategy. In this respect, large joint weapons programs may be the last aspect of joint operability that has yet to be conquered. Changing the way these programs are managed is not for those who are faint of heart. It will require some to give, so that all may gain.

As stated previously, the first step on the journey in making positive changes to the force under declining budgets is to begin with clear strategic guidance. This research proposes that the strategic guidance be limited to one primary directive, and that a logical connection to the current strategy would be to make defending the homeland that prime directive. To expand the concept of defending the homeland beyond only a defensive mindset, the research proposes that defending the homeland in depth be used to encompass the question of defending the homeland from what. Depth covers many facets of joint functions and design elements in operational planning, and would therefore aid in the conceptualization of making this focused strategy operational against a variety of threats to the homeland and our national strategic interests.

This guidance needs to be directed toward this one thing we must do before all else. It is the author's assertion that depth is the best element of operational design to use as a descriptor to aid in conceptualizing the nature of the defense of our homeland. To defend the homeland in depth directs more than a defensive posture. Depth as defined by Joint Pub 5-0 is:

> The concept of *depth* seeks to overwhelm the enemy throughout the operational area, creating competing and simultaneous demands on enemy commanders and resources and contributing to the enemy's speedy defeat. Depth applies to time as well as geography. Operations extended in depth shape future conditions and can disrupt an opponent's decision cycle.

> Strategic attack, interdiction, and some IO capabilities are applications of depth in joint operations. Operations in depth contribute to protection of the force by destroying adversary potential before its capabilities can be realized or employed.[27]

Although this definition is limited to the operational environment, it does add to the concept of depth in defending the homeland. Depth directs capabilities that complicate the enemy's problem. Whether the threat is transnational terrorism or a peer competitor methodizing defense of the homeland in depth will add to the enemy's complexity while buying our nation time and space thus maintaining our advantage and stability.

A way to increase capability to defend the homeland in depth under constrained fiscal reality is to focus the strength of our people, the training they are provided, and the equipment they use.

The nation has been in this place before. We have had these similar arguments in the past, particularly as Vietnam was winding down. At that time, the U.S. had a military with equipment that was not mission ready, and a home front opinion that was not favorable either toward expansion of the military's budget or continuation of the draft. The nation must use this past experience and not ignore the reality of the probable near-term future; we must embrace the reality of what we can expect to work with, and optimize those means to the best of our ability.

As Vietnam began to wind down and the nation's strategic guidance narrowed to nuclear deterrence and defense of Europe and Korea; the Services realized that a shift must take place. Just as there was a shift in the mid 70's, there will be a shift that will occur beginning in 2010. It is useful to prepare for this shift by analyzing how we will

[27] Joint Publication 5-0 26 December 2006, p IV-24

man, train and equip this future force. In 1972 it was apparent that the draft would end, this meant that an all volunteer force was needed. The most apparent outcome of this fact was that these Soldiers, Sailors, Marines and Airman would cost more for each individual; secondly, we could pay for a smaller number of more skilled recruits. These skills allowed for more complicated equipment and training. These facts made way for the creation of the compact, high tech, extremely capable force that has been in use for the last thirty years.

Measured against GDP, military spending from 1974 to 1981 decrease by an average of 40 percent, it was under these austere budget conditions that AirLand Battle was conceptualized to make operational the precise strategic guidance. In its time, AirLand Battle was a transformational stroke of genius. The nation needed a methodology to fight a war in Europe, and systems to counter the Soviet threat. That threat was an immense monolithic army, air force and navy that would fight across the familiar geography of two world wars.

Our counter to that threat was brilliant. We could not hope to match the capacity of the enemy: that course would be far too costly to equip, and require conscription to man. The answer was to utilize technology to field a smaller but more capable force to defend Western Europe. We would use air, sea and land forces in unison to thwart any Soviet aggression. We countered the Soviet threat not by matching it, but by countering it via an asymmetric model. In large part, the Soviet's attempt to counter our strategy caused the collapse of our adversary, a collapse from which they are just beginning to recover.

What is the threat today? As the vastly superior military force on the globe, the U.S. is being targeted from all sides; without more information, the nation is unable to determine the exact number and priority of threats. Could we face a peer competitor, continual transnational terrorism, or perhaps a global economic or biologic catastrophe? Might the real threat be instability on a global stage, or global instability and insurgency? It is our military's mission to be as ready for any one of these outcomes as we can afford to be, and to be wise enough to prepare appropriately for the most probable and severe threats. This could best be programmed by our Services if the starting point is clear guidance that defending the homeland in depth is the prime directive.

However, today we are solving the realities of the "now" with the solution that worked thirty years ago. A small-capacity, highly-capable traditional force is not the answer to the threats of the future. The threats of the future require a change in the makeup and capabilities of our forces.

We should be looking at a reserve of human capital from which to pull varying capabilities. This paper cannot fully address the detail required in all aspects of right-sizing the nation's future force given the probable future fiscal realities. The needed changes cannot be realized by today's legacy defense industry, change-resistant generalship and a legislature that fails to confront the difficult aspects of change in favor of the status quo. The problem is large and the future is unknown. Therefore, until more is known, what is most important is that we size and shape the military of the future to be flexible enough to counter all future threats as capably as possible under budgetary constraints to defend the homeland in depth.

Our nation cannot allow its focus to be narrowed either toward traditional capabilities or toward countering disruptive threats. In order to counter both, to deny the enemy the ability to find weakness in our nation, we must first be willing to decrease our current and planned capability that exists to fight in the traditional realm. Given the likely budget reality for the next 10-15 year, if we cannot see to the decrease in the traditional, we cannot grow what is needed to counter where the enemy is now. It is from this standpoint that this research will explore a real-world program and propose how it must change to allow for growth in other areas, while maintaining an undeniable advantage in state on state warfare.

The methodology AirLand Battle bridged the gap between a worn out military, still stinging from Vietnam, to the military that would be uncontested for twenty years. This bridge occurred because the political leaders charted a clear programming course for the Services. The Services could program systems in the areas of their own core competencies, but through the methodology and clear course these systems developed and were linked together.

The needs today are different, but history must be our guide. For the next 10-15 years defense spending will be flat or declining, and we need clear guidance that defending the homeland in depth, is the prime strategic objective. We have these two constants from which we must develop a multi-role, well-trained, joint force, manned by a base of superb trained professionals.

This joint force must have joint programs that afford sufficiently effective, sufficiently efficient, and sufficiently adaptable capabilities that evolve under the

constants of budget and guidance.[28] To create this joint force, one must start by looking into one system at a time. The system that will be explored in this research is the Joint Strike Fighter (JSF). This program has its roots in the traditional realm, but when looking at ways to defend the homeland in depth, it is clear, manned aircraft that can defend our nation from airborne attack and strike those that will do us harm at their home is needed. Through an illustrative example the question that this research will answer is: what is the best shape of the strike fighter force for a sufficiently effective, sufficiently efficient, and sufficiently adaptable capability as we shift to our prime directive under constrained budget realities? The example of how this might be done in one program is presented and is intended to be applicable, in some substantive fashion, to all major development and acquisition efforts. The objective is to avoid another "hollow force" when we can least cope with such a military condition.

[28] The terms effective, efficient and adaptable are found in several of the nation's strategic guidance documents to describe favorable capability characteristics. The author is using these linked terms to describe the foundation under which change or transformation must take place given the likely budget reality. Because budgets will contract, the concept of sufficient effectiveness, efficiency and adaptability is required so that a balance of capabilities will be maintained thus avoiding a hollow force.

An Illustrative Case

In choosing a program to research, it was important that the program have the characteristics discussed up to this point in this paper. The program needed to be one of today's high cost programs, it needed to apply to the strategic guidance, it needed to have strong interest from both the Services and legislature and it needed to have a history in the traditional realm. Currently the largest U.S. weapons acquisition program is the Joint Strike Fighter (JSF), totaling over 300 billion dollars for three U.S. models and multiple overseas models. This program is truly a giant in the programming world. In researching right-sizing the force under conditions of fiscal reality, there is no other program that will have as significant a financial effect on the rest of defense. This program was begun in an effort to provide the follow-on platform for an aging enhanced tactical strike fighter capability and capacity that the U.S. has maintained since the Second World War. The three JSF models to be purchased by the U.S. will replace the capacity and capability of F-16 Falcon, the FA-18 Hornet, and the AV-8B Harrier as the leading edge of manned airborne offensive and defensive weaponry.

In the world of air warfare programs the JSF follows the F-22 Raptor. The Raptor was designed to replace the F-15 Eagle as the leading air superiority fighter in the world. Originally programmed to field 684 fighters for $86 billion, the reality of the program is currently 183 fighters at a flyaway cost of over $66 billion dollars.[29] The JSF program administrators must learn from the Raptor programmers and not repeat the same history of spiraling costs, offset by shrinking units. This process ultimately raises per unit cost to

[29] Leslie Wayne, "Spending More for Less Is Frequent In Weapons Projects Since 9/11" *The New York Times* (New York), 11 July 2006, C-1

a number the tax payer and the legislature finds unsatisfactory causing the demise of the program. Moreover, the Raptor was designed to counter the Soviet fighter threat, and as that threat retreated little was done to reevaluate the need for changing a "fighter only" capability until very late in the program. It was not until the program was well on its way that changes were made to incorporate strike capability into the existing airframe. These late changes added to per unit cost, and were not as effective had they been incorporated earlier, but without this change the program would have likely been cancelled.

As it is with many weapons systems, there currently exists a growing crisis in our military's strike fighter fleet. The aircraft are reaching the end of their fatigue life, and few replacements are being produced. The AV-8B Harrier, F-16 Falcon, and F-18 Hornet are reaching the end of their life expectancies before replacements have been produced. This problem is exacerbated by delays in the JSF. In the case of the Raptor, one aircraft was aging out; in the case of the JSF three aircraft from three Services are aging out as this program moves forward. The similarities in the progress of these two programs are eerie. The Government Accountability Office points out in a March 2006 report: "…the JSF appears to be on the same path as the F-22A program. After being in development for 9 years, the JSF program has not produced the first test aircraft, has experienced substantial cost growth, has reduced the number of planned aircraft, and has delayed delivery of the aircraft to the warfighter."[30] The similarities in the two programs need to alert those who believe a tactical strike fighter capability is in our nation's interest.

Manned offensive and defensive airpower provides fighting forces that must be flexible and capable, a marked vital advantage that must be possessed if we are to defend

[30] Government Accountability Office, "Tactical Aircraft: Recapitalization Goals Are Not Supported," p.9.

the homeland in depth. If it is assumed that we must fill requirements that will be left vacant by aging legacy airframes, the replacement program must answer the following questions. How much money do we have, what is the threat and how do we best counter that threat?

Though never intended to be a one for one replacement of the Hornet, Harrier and Falcon, the original number of JSF aircraft in the program were more substantial than they are now. At the start of the program in 1996 the U.S. Defense Department was to buy 2,988 Joint Strike Fighters at an undermined acquisition cost and would field initial operation (IO) in 2010.[31] At the system development start in October of 2001 the total number of airframes stood at 2,866, the total program cost was 233 billion, the flyaway cost per unit was 81 million, and IO was to occur in 2010-2012.[32]

During a rebaseline in December of 2003 the total number of airframes decreased to 2,457, the total program cost was 245 billion, the flyaway cost per unit was 100 million, and IO was to occur in 2012-2013.[33] The latest available data in December of 2005 shows the total number of airframes at 2,458, the total program cost was 277 billion; the cost per unit was 112 million, and IO was to occur in 2012-2015.[34] It is safe to expect that the update to be published this spring from DoD data will show either an increase in total program cost or a decrease in total airframes and in either case an increase in per unit fly away and system costs.

The opinion that these cost increases and production decreases will continue is stated by Bill Dane: “Lockheed Martin continues to wrestle with team members over

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[31] United States Government Accountability Office, Report to Congressional Committees, “Joint Strike Fighter: Progress Made and Challenges Remain” March 2007, p. 5.
[32] Ibid.
[33] Ibid.
[34] Ibid.

technology transfer and work share issues, while also having to absorb rising program costs and schedule delays. Both the U.S. Navy and Air Force are now considering scaling down procurements, at least for the near term, and there is mounting concern regarding the inevitable unit cost increases resulting from such measures."[35] This way of doing business has come to be what is expected, particularly in large and expensive weapons programs.

This programming model has other less-than-desirable characteristics. Contractors are given incentives if they keep costs down. If the contractor meets timelines, weight limits, cost limits and a plethora of other performance measures as spelled out by the contract they will be financially rewarded. This practice is common both in defense and in the private sector. What seems different from the outside observer is that defense contractors are rewarded for portions of the contract that may be on track even though other parts are behind. The contractors are given benefits for specific performance objectives met but not penalized for other performance objectives missed.

This practice is pointed out by Jen DiMascio: "…;Lockheed Martin's F-35 Joint Strike Fighter, which received all award fees even though it was 11 months behind schedule and 10.1 billion over cost and Lockheed Martin's F-22A…"[36] This article of Jen DiMasio's does not specifically address the cause of the delays or overruns, which likely resulted from either contract mismanagement or from a lack of Service Acquisition discipline allowing changes to the program to be made for which the contractor then

[35] Bill Dane, Aviation Week & Space Technology, "Fragmented Fighter Market: Forecast for Fighter Aircraft; Eurofighter flexes muscles as U.S. Eyes F-35 JSF cuts, 15 January 2007, Vol. 166, Iss. 3; p. 20.
[36] Jen DiMascio, "Walker: Practice of overselling Weapons Systems Drives Up Acquisition Costs," *Defense Daily*, 8 September 2006, Vol. 231, Iss. 45, p. 1.

needs to charge. In either case the working relationship needs to change to keep cost and timelines on track.

Cost overruns and timeline expansion of programs have not always existed at the scale currently experienced. During the last generation of manned aircraft development, timelines and budgets remained more closely on track, while contractors competed much further along in the development process to field a new design. The F-16 Falcon, F-20 Tigershark, and YF-17 Hornet fought a tough contract fight and the median priced F-16 won, though the Hornet was re-designated the FA-18 and bought by the Navy. This competition fielded the results required, was much closer to budget, and required far less time to create and field than the newest generation's process for strike fighter programs. Leslie Wayne offers: "By contrast, the F-16 fighter jet began as a less ambitious program and was built in four years, using proven technology. It has been flying, with continual upgrades, for 30 years and is considered the most successful fighter jet in history."[37]

There were those at the time who argued and (still believe) that the less expensive Tigershark was the contract winner, and would have responded to modifications more readily than the Falcon. Additionally, unknown at the time were world events as we see them now. It is hard to argue that even if the Tigershark was slightly less capable than the Falcon, it would have been any less effective if used in place of the Falcon over the last thirty years. An additional factor is if history had taken a different turn, there were multiple designs that could have rapidly expanded our production capacity if that capacity had been called for. The idea of competitively producing different aircraft has evolved to designing three hybrids of the same platform from one manufacturer. This

[37] Leslie Wayne, "Spending More for Less Is Frequent In Weapons Projects Since 9/11" *The New York Times* (New York), 11 July 2006, C-1

idea in theory was to save the production cost of the three different designs; however, from a pure program performance, this measure seems to be counterproductive.

The three versions of the JSF are advertised to "…--employ a modular mix of components, systems, and technologies with commonality projected at 70 to 90 percent in terms of production cost. Many high-cost components, such as engines, avionics, and major structural components of the airframe, are common among the three models."[38] However, each version does require redundant cost associated with the individual differences in the airframes. Some of these costs are associated with flight control software, support equipment differences, and even whether to put the stick in a sides-stick configuration like the Falcon or in the more traditional center stick configuration like the Hornet and Harrier.

As the program matures it will be interesting to note if the 70-90 percent commonality in production costs is realized, and if it is closer to 70 percent or 90 percent. The three versions will at some level have differences in long term rework and overhaul. There are substantial costs in maintaining a fighter jet as described by James Boxell, "Lockheed's decision to seek new role models aims to design a cost-effective plan to support, maintain and upgrade as many as 4,000 JSFs over 47 years. It costs at least twice as much to maintain a fighter jet as to build it. Lockheed wants to drive this sum down so that only half the JSF budget will be spent on future repair and overhaul

[38] Anthony H. Cordesman with the Assistance of Paul S. Frederiksen and William D. Sullivan: *Salvaging American Defense: The Challenge of Strategic Overstretch:* (Center for Strategic and International Studies, 2007), p. 294.

work."[39] It is suspect whether Lockheed will be able to decrease this substantial historical cost of fighter aviation, cutting it four times.

Another difficulty common in aircraft development is weight, with the most restrictive weight limits faced by Short Take Off and Vertical Landing (STOVL) aircraft. Making a jet that can hover requires a greater than one to one thrust ratio. If the engine design provides a specific amount of thrust than the only variable one has to work with is weight. When designing an aircraft with a focus on commonality, the weight limits required by one version may be counterproductive to the capability goals of another. A Navy acquisition chief offers: "Keeping The Weight Off. Delores Etter, the Navy's acquisition chief, tells reporters last week that the Service has a special team addressing the issue of weight on the STOVL model of the F-35Joint Strike Fighter (JSF)....Etter adds that her focus right now is on the STOVL F-35B for the Marine Corps and making sure the aircraft reaches the next milestone in the program—first flight in summer 2008."[40] Difficulties with the STOVL have caused some changes, but it has yet to be revealed how these changes will affect overall commonality.

There are many problems one can identify with the JSF, and without being on the inside of the process it is difficult to comprehend the full scope of the positive vs. the negative. However, if the program continues to cost more, for less being delivered out the front door, Congress and the American public will take an interest and possibly end a program that needs to proceed to maintain the nation's lead in manned strike fighter capability, and to defend the homeland in depth.

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[39] James Boxel, "A military jet that is a bit like Christamas; Lockheed is looking to the likes of Wal-Mart for ideas on keeping its Joint Strike fighter operational," *Financial Times,* 15 May 2007, p. 16.
[40] Defense Watch, "Defense Daily," 5 March 2007. Vol. 233 Iss. 41, p. 1.

Basic Fighter Maneuvers

If the research assumptions up to this point hold true that the overall defense budget remains flat and funding for greater troop levels with a more diverse mission in the ground forces are actualized, then some programs and costs must be reduced. There are several programs that must be looked at and changed to fund our future optimally, but this research will focus on one. The JSF, being the largest weapons program in the defense budget, will likely face further cuts as future fiscal realities come to fruition. As the JSF program is cut from its current form, our nation will be left with a capability and capacity shortfall that will be difficult to recover. Once again, the JSF program is an attempt to keep the nation's national defense strike fighter capability at an enhanced level.

An attempt was made in the previous chapter to show that spiraling cost, reduced unit numbers and the existence of three complicated designs for the JSF leave little doubt that further production reductions are probable. It appears that the die has been cast, and if a change in our current direction does not occur, at best our strike fighter capability will be left at a basic level. If the case being made up to this point is valid, a major change in the current JSF program must be implemented as quickly as possible. We must be prudent and clear with our means so that we can field a strike fighter force that provides us with a sufficiently effective, sufficiently efficient, and sufficiently adaptable strike fighter capability for the foreseeable future. Such capability must be built into our interdependent joint force that performs its desired aspects of joint functions when needed. It seems most likely that the attempt to hold on to this program, in its current

form, will leave us less capable than if we give up some of what is most important to the Serivices, to gain much more as a total force.

How much capability will we lose as a nation if we build one common version of the JSF, and what can we save? These questions are proposed with no malice, and with the realization that communities, careers and passion are involved with platforms flown. Our Service cultures, competitions and rivalries have flourished in the small differences with the equipment we use. But the nation will not, and probably cannot afford to fund these emotions without more tangible gains equated to these differences.

The unique STOVLcapability has existed for one generation of aircraft. The Harrier has served well, and has been a backbone of the air arm in an Expeditionary Strike Group (ESG). Clearly the loss of this capability will require the ESG to be dependent on fixed wing capabilities from Carrier Strike Groups (CSG), land based Marine aircraft or Air Force aircraft. The loss of that integrated organic asset to the ESG will cause a more complicated problem for the ESG commander and will limit the flexibility of the ESG to operate in an autonomous manner in certain environments. The loss of STOVL would change the configuration of the ESG to a helicopter and Osprey centric air arm.

The loss of STOVL in the ESG could not be totally mitigated, but CSGs could fill the gap when needed and replace the strike fighter capability of the ESG with coordination. Even today it is hard to imagine an ESG operating in a high threat environment needing fighter cover and strike capability where a CSG would not be positioned in the same geographical area. This would clearly be an area of

interdependence not always required in our current configuration. The loss of STOVL is a difficult problem but can be overcome by cooperative joint interdependent operations.

The F-35B STOVL is the most expensive and difficult JSF version to produce and maintain. Canceling this version would simplify many problems the program faces today. The loss of this fiscal burden would free up money early and allow for higher production runs more quickly reducing overall per unit costs. Some dollars saved on this version would need to be diverted to other platforms to fill the ESG decks and to insure optimization of the ESG capability.

F-35C: the second most expensive version of the JSF is the carrier capable JSF. The stresses and strains of carrier operation, the space constraints of the flight deck and the endurance times required for carrier operations mean that this version is slightly heavier, has a wing fold system and an overall larger wing area for lower fuel usage while holding at slow airspeeds. These factors together slightly reduce the capability of the platform in the tactical environment. By most accounts, in past aircraft programs, this reduction was not significant. As an example the differences between the YF-17 Air Force version and the FA-18 Navy version was measurable but not significant enough to make a difference in the real world. The real difference would be truly measured by the person in the cockpit. Of more concern is the price difference: making a carrier suitable aircraft is more expensive than a ground based platform. Aircraft built to the constraints required for the carrier environment are not as efficient as aircraft built to the constraints of land operations.

A decision not to build the naval version of the JSF would leave a sizable hole in the strike and defense capability of the CSG. This change would require the additional

procurement of existing carrier aircraft. The Navy would be required to buy more FA-18 Super Hornets to fill the void in numbers of aircraft on our carrier flight decks. This replacement would not be a one for one swap in capability but would provide for a robust capacity toward most likely threats. Cutting both the STOVL and Carrier version is proposed in a Congressional Budget Office (CBO) document: the findings of this proposal would save $9 billion over the next five years, and $14 billion over the next 10 years, but would ultimately save $13 billion over the life of the program due to higher cost to the Air Force (because their small JSF buy would have a higher per unit cost.)[41] This five percent savings in a 275 billion dollar program needs to be balanced against what would be lost.

The same CBO document does an accurate job at defining the main disadvantage in this course of action. The F/A-18 E/F Super Hornet is far less stealthy than the F-35C JSF, and canceling the F-35C could limit Naval Aviation operation early in a conflict, before the enemy's defenses have been suppressed.[42] This shortcoming may be mitigated in the future by the use of unmanned vehicles, but developing that capability for carrier decks and LHAs is much more complicated than deploying it from an airfield. When measured against history, having carrier aircraft that are not capable enough for use in the first phase of conflict runs counter to how carriers have traditionally been used. Often it is the aircraft carrier that is the first platform on scene to deter, dissuade or defeat an aggressive act while basing access and deployment plans are worked out. It is not as much the depth of operations from the aircraft carrier that matters, but instead the speed, reach and capability that a carrier possesses.

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[41] CBO Budget options p. 14.
[42] Ibid.

The loss of this capability might ultimately marginalize the CSG as a viable fighting force, making the overall investment in 11-12 CSGs less beneficial to the nation's ability to project power. The loss of CSGs in conjunction with the loss of fixed wing strike aircraft on the ESGs would ripple through the entire framework of the nation's defense, impacting free trade, sea lanes, dramatically decreasing our nation's reach and power on the world stage.

The F-35A is the least expensive version of the JSF for all the reasons specified above, and is in a limited way the most tactically-capable version (because of the smaller number of restraints placed on the land-based design). At the current time the U.S. Air Force plans to buy over 1700 F-35As, making this the largest portion of the program; the Navy plans to buy just over 600 F-35B's and C's combined. This makes the version that the Air Force plans to use the most cost effective from an economy of scale standpoint. No data or consideration was found in outside documents discussing the loss of the land based version and replacing it with the Super Hornet or an upgraded Falcon, but consideration of that course of action must take place.

On the surface the loss of the F-35A would provide the same outcome outlined above, but would apply to the Air Force's capability rather than the Navy's. This course might not be as detrimental during the initial stages of a conflict, but unlike the carrier based Navy, the Air Force is expected to field the capacity and sortie generation rate for sustained air combat. The loss of the land-based JSF would limit capacity until the enemy air defense is suppressed: but without the requisite capacity, the suppression of those defenses comes into question. This capacity from land-based aircraft could possibly be replaced by unmanned vehicles and weapons; however, although this is more

simply done from land than from sea, there is no unmanned program that exists to fill the loss of the F-35A in the time required.

To reemphasize: it is the assertion of this research that if we do not right-size the JSF program voluntarily and prudently; it will be wrong-sized for us due to fiscal realities. Additionally, all that is possible must be done to transition from a costly enhanced capability to the most effective, efficient, and adaptable basic strike fighter capability we can for the next 10-15 years. All three of the above options, loss of the STOVL by itself, loss of the F-35C and STOVL combined, or loss of the F-35A by itself seem to bring rise to problems that endanger the nation's strategic interests regarding strike fighter capability and or capacity.

Interdependent Force Structure: A True Joint Strike Fighter

The following future solution has strong roots in the past; the F-4 Phantom was that platform that equipped the Air Force and Navy with the same carrier capable airframe. This success story overshadows anything that can be attributed to the F-16, FA-18 or AV-8B. The future solution that must be considered is the development of the F-35J as the single model Joint Strike Fighter in addition to an appropriately sized buy of a more capable FA-18J Super Hornets for all Services to use as their fixed wing strike fighter aircraft. The "J" series of these two aircraft would be for all services and would impose disciplined configuration controls. This would limit the loss in quick reaction capabilities that a land-based-only platform would entail, and would provide sufficient capacity and capability from Air Force airpower. Some of the ESG problems would remain, but this plan would be the best option to provide a future of cutting-edge Marine Corps airpower either from the sea or land. Economy of scale, supply chain management and interoperability would have significant financial benefit. It would also represent the first time that an airframe used by Naval Aviation, Marine Corps Aviation or Air Force Aviation would share a 100 percent interdependent, interoperable, production and maintenance capability. This would provide the best basic strike fighter capability and capacity our nation could produce given the current fiscal reality.

Those who feel or know they are on the losing side of this proposal have the responsibility to remind themselves that this argument must be framed in the context of the country's ability to enforce its security interests. Clearly the Marine Corps will lose the ability to operate fixed wing strike aircraft from an LHA or LHD but would retain the ability to have their trained warfighters in the seats of their aircraft. This ability to

maintain a core competency in the cutting edge platform is a key component to viability in any future conflict that the Marine Corps might be asked to participate.

The Air Force might immediately dismiss this proposal as too costly: after all, it is more expensive to build a carrier suitable aircraft than a land-based version, and in doing so you lose a measure of performance. This is more than overcome by the facts that the performance of a carrier capable version is nearly equal to that of the land-based version and that the economies of building one version with consolidation of rework facilities, training locations and support equipment over the life of the program will most certainly be enough to make this concept of cost benefit for the Air Force. This is also the course that will provide the Air Force the capacity needed to maintain their preeminent core competency. These benefits are even more favorable if measured against where the program on its current course is likely to go when further cuts are made. In short, this single version template is the most effective, efficient, and adaptable aircraft for our nation's future.

The final group who might reflect on this proposal as a loss could be those who are advocates for our joint capabilities. The Joint Staff and the Joint Forces Command Staff may look at this proposal as a loss of investment in programs that are close to completion, arguing that real saving cannot come to fruition because, to use a cliché, "the train has left the station". To this, one must look again at the hollow force discussion earlier in the paper. If the assertion that fiscal reality will continue to have an affect on the JSF program into the future holds any weight for the reader and the final outcome of three linked but different JSF models continues, the nation will find itself with a dispersed, small, hollow strike fighter force.

On the other hand, manufacturing a single version template makes the most sense giving the fiscal future. Additionally, if one considers the rapid rate of change in technology, a slower approach to the future of manned aviation might ultimately be beneficial for our nation's future capability. One only needs to look at the last generation of strike fighter aircraft: the capability of F-16s or FA-18 has grown dramatically over the last twenty years. It is likely that this trend will continue, and will likely continue to accelerate over the next 10-15 years. If in the next 10-15 years a peer competitor begins to emerge and traditional warfare looks as though it poses the dominant threat to our nation, the work done on the other JSF models will still exist, and the lessons from operating the single JSF, combined with leaps in technology, will provide the nation with the most effective, efficient, and adaptable strike fighter capability for our nation's future.

As the Joint Staffs looks at this program in the context of right-sizing the force given fiscal reality, other courses of action run the risk of losing the strike fighter capability from the Navy and Marine Corps. If any aircraft carriers lose their future day-one-strike capability, then the argument for the high cost of the aircraft carrier must come into question. If aircraft carriers are lost, it is hard to imagine an ESG working by itself to secure a port or beachhead. It is not certain that this slippery slope will play out, but that it might. The unknown future may provide solutions to all of these concerns, but until that future is known, maintaining the core competency from the land and sea is crucial.

If the JSF program continues on its current course and fiscal realities are more restrictive than expressed in this paper, the risk of losing the program all together is another slippery slope that must be considered. As stated earlier the F-22 Raptor was

designed to replace the F-15 Eagle. The F-15C/D airframe is already in a life cycle crisis with the F-15E model not to far from the same situation. The F-22 buy is too small to take the place of those two legacy airframes and the Raptor itself is already in need of technological upgrades to bring it into the network. If the JSF program is not adjusted to exist under a constrained resource model, the loss of a manned strike fighter core competency may occur from the sea and ground.

In defending the homeland in depth, a defensive perimeter around our nation is needed. The reserve component has been the organization charged with fulfilling this mission. The smaller the buy of Joint Strike Fighters becomes, the less capable this defensive perimeter will be. The reserves cannot be an organization of hand-me-down legacy airframes. Even if adequate capability exists now, the reserve component is where we pull our trained human capital from when needed. These war fighters must be trained in sufficient quantities, with the most modern equipment, to pass on that training to others, should mobilization be required.

To price this system beyond our expected fiscal future runs the risk of losing an advantage we have had for sixty years. As stated previously, the loss of this skill would be difficult to recreate and is a path toward a hollow force.

Clearly if one believes the baseline defense budget will grow to five or six percent of GDP over the next 10 - 15 years, then the most effective concept would be a robust force of three to four thousand JSFs in three distinct models. However, under the current fiscal reality, the single model concept is the most effective, because it allows for seamless integration of all phases of the program's life cycle.

This integration facilitates benefits not only in the area of effectiveness, but also in efficiency and adaptability. The effectiveness of the single model proposed by this paper would allow for matches in performance across all three Services. This would allow for employment with like tactics, flight profiles, tanking requirements and a multiple of other employment considerations that might be similar with other aircraft configurations but would be identical under this single model proposal.

Sources were quoted earlier in the paper as to the 70-90 percent commonality in terms of production costs. A single-joint-model program would not only result in one hundred percent commonality in production, but a one hundred percent across all phases of the aircraft life cycle.

Consolidating the expertise and experience in tactical development from the three Services would enhance the overall effectiveness of the new platform much more rapidly than if the three Services had three different versions of the JSF. Joint employment doctrine and tactics would allow development of a common standard operating procedures and standard tactical employment.

Consolidating the capacity of the Service's test and evaluation efforts would increase the efficiency of getting new weapons and systems out to the force in less time, and with ultimately less cost. Having the latest capabilities on the battlefield as timely as possible is clearly an aid to effectiveness.

Consolidating safety lessons and best practices across all three Services would ultimately make a single-version JSF safer. This decrease in mishap rates as compared to three versions would save lives and increase the effectiveness of the entire program.

The efficiency of the single-version JSF is the cornerstone to this concept. For all the same reasons that creating the three version JSF was more efficient than three unrelated aircraft programs, a single version magnifies those efficiencies. The efficiency gained adds directly to the effectiveness and adaptability of the single model JSF. Commonality lends itself to efficiency.

One potential problem, once considered, quickly reveals itself as an opportunity. The Air Force uses a different in-flight refueling system, than the Navy and Marine Corps. If the two Services use a different system; then one Service will need to change a way of doing business. Currently, the tanking of most strike fighter forces is done by Air Force assets. This is an interdependent aspect of joint operations that has been resolved and is doctrine. As a point of fact the Air Force needs to replace its aging tanker fleet, not for just for themselves, but for the entire air arm of our nation. Making the single model JSF a basket tanker platform which it would need to be to operate in the carrier environment provides a synergy that we currently do not experience. This basket tanking system is what is used by all NATO strike fighter and helicopter Forces other than the U.S. Air Force. Boom tanking does not need to go away; keeping boom tanking for the Air Force's larger aircraft would be wise because basket tanking with those very large platforms is difficult although it can be done.

At the same time the synergy of having a basket tanking system on the single model JSF would improve several problems we currently deal with. In practice it is rare to have large aircraft and fighter aircraft using the same tankers or same tanker tracks. Large aircraft usually require most of the fuel a tanker has to offer and that tanking is often done far away from the area of operation. However, fighters from all Services go to

the same places to get gas on the same tracks. The problem we currently face is that tanker configurations do not always match the configuration of the aircraft that is looking for the gas, and not all tankers can give fuel to both basket and boom receivers without changes being made on the ground. This causes problems when airborne changes occur, as often happens. This makes moving the right assets to the right location difficult when trying to serve two different types of receivers with tankers that might only be configured for one. Lastly, when considering foreign military sales, providing tankers with basket systems is far less costly than a boom system, because a basket system can be installed on smaller delivery platforms.

Besides amplifying efficiencies already realized by the three model programs, having a single model program would allow for a quantum leap in supply chain management. This leap would not be found just in parts and maintenance but in our nation's entire concept of operations. This line of logic also plays to the adaptability of the single model program. This would, for the first time, allow all three Services to move assets between themselves and each other, whether for combat capability and capacity or to manage the life of the aircraft.

As an example, imagine an airfield or carrier that takes mass damage to its aircraft. This new flexibility would for the first time allow Services to move aircraft quickly between land and sea based units to position them for the fight. If needed, a nuclear powered aircraft carrier could deliver a large quantity of fighter aircraft to an Air Force unit overseas very quickly without international coordination, over-flight concerns or tanking requirements. That same ship could then bring back others if needed for maintenance or redeployment.

Another example of efficiency with the single model JSF comes in the management of fatigue life. This concept has been employed with success with the FA-18 Hornet. The shore based Marine Corps aircraft were short on fatigue life due to flight hour life cycle and Navy Hornets were reaching their life limit due to the number of carrier arrested landings on the airframe. The solution was to swap airframes, ultimately getting more use from the same airframes. The fact that this fix was done at all, does highlight that new aircraft are needed to replace the aging fleet.

Several aspects of adaptability have been highlighted through direct example and through induction during the discussions on effectiveness and efficiency.

The discussion of how right sizing the force structure during the next 10-15 years in a fiscally constrained environment has focused an illustration involving the JSF. However a similar discussion must occur with regard to many programs to make the accumulation of effort effective enough to provide programs for the strategic future requirements described in the strategic guidance.

This concept suggests that a purposeful approach to moving an enhanced strike fighter capability to a basic one “must be done by us before it happens to us”. The point her is that fielding the JSF is needed, but it needs to be done differently than now envisioned. A single model JSF could fly with any of the three Services, from a wide spectrum of operational environments. To be adaptable, one must have capacity in both equipment and human experience; it is in this last dimension that the current JSF program falls short most severely and incurs unnecessary risk.

Balancing Human Capital and Equipment Capital

The strike fighter capability is optimized toward traditional warfare. There are some applications for strike fighter capability in homeland defense and irregular warfare, but other platforms and programs could also be optimized specifically for those roles. In designing the future program to best deal with a possible future peer competitor or as an arm of national power, the JSF is a nice fit; however, in its current form, there are some aspects where the JSF program falls short. Its small payload capacity falls short in a low threat high capacity environment, and the lack of a gun presents a limitation when compared to the F-15E Eagle or FA-18E/F Super Hornet as a close air support platform. But that is not the most severe limitation of the program. The likely future JSF program will leave the nation short of trained expert strike fighter pilots. In its current form the JSF program has decreased from 3000 aircraft to 2400 and is likely to decrease further. This is to replace over 3000 F-16s 1000 F-18's and several hundred AV-8Bs. As stated several times in this paper the move from depth to technology whether you call it recapitalization or transformation may not be the most cost effective option. In fact, it may leave the nation less able to defend itself against a belligerent peer or provide the adaptability needed to counter continued global terrorism and insurgency.

The JSF, as it is progressing, is a technological leap in manned aviation. Like the F-22, it is superbly stealth in the radar environment. More than the F-22, it has been designed from the beginning to be incorporated into the friendly battle space network. These technological leaps have been expensive to create and incorporate, and the predicted future of technological growth will be difficult for any one platform to keep up with. But this technology is needed when assessing the future for strike capability into a

future peer's hostile territory. Are both needed in all of the nation's future manned strike fighter aircraft, and to what level are both needed?

First, in considering stealth capability: having a stealth aircraft that can share information is of great benefit, and no pilot would advocate giving up a bit of capability; however, nor would any pilot give up having a wingman at some distance where they can help in a difficult situation. No nation should give up the ability to have sufficient numbers of reserve pilots, particularly in the event that changes in offensive or defensive technology make future unmanned aviation less capable. The JSF provides the capability to fly against modern surface to air missiles, but in order to do this; its weapons loads are limited. This capability is emphatically needed for our nation to continue with its ability in air superiority. While and once air superiority is achieved, the JSF program in its current form might not provide the flexibility for the depth of experience and capacity of hardware that may be needed. Lastly, in a lower threat or defensive scenario a JSF only concept might not provide the weapons load needed against a technologically inferior superior capacity foe.

Recent advances in networking of the battle space have had a strong positive effect on the capability of U.S. forces. This clear advantage must be pursued and incorporated into the nation's future fighter force. The technology of networking adds a quantum capability to all of our current and future fighter aircraft. However, no matter how stealthy or capable a platform may be, putting a life at risk for network support may not be as prudent as designing an unmanned platform that is specifically designed as a network node.

A manned aircraft provides immense capability and at the same time , can have enormous limitations. Training a current or future fighter pilot is a 5-25 year process. It is not until four or five years of experience where the costly investment of that training is fully realized. The JSF program in its current form leaves a deficiency in future capacity of trained fighter pilots if needed to fend off a belligerent peer.

This paper addresses rightsizing the U.S. force for the next 10-15 years given the probable fiscal environment post OIF. For consideration, let us examine where a shortfall in capability relating to airborne strike and defense capability might occur.

First, let us assume that it is 2020, and nothing has changed in the current JSF program. The JSF has been produced for about 7 years and approximately 50 percent of the total 2400 aircraft have been produced. Nearly all of today's frontline fighters have reached their life limit. The Air Force has 180 F-22 Raptors, and 1000 JSF's. The Navy has 400 FA-18 Super Hornets, and 300 JSF's.

A global situation develops where the threat of a near certain large scale world war develops. The U.S. and its allies begin a full scale mobilization, producing all that is needed to counter this threat.

Given this scenario, history has shown that building the hardware is not the limiting factor. Having the skill sets to employ that hardware will be the biggest limit to expansion. Change the above future scenario; imaging that the U.S. possesses a total of 3000 aircraft in Service, and the nation's capacity and ability to mobilize with skilled front line pilots and instructors trained to fill the flood of hardware being produced is multiplied by a minimum of 1.5. In reality, much more capacity would exist with this larger basic fleet of aircraft because of the depth possessed in the inactive reserve and

civilian sector of recently active experienced fighter pilots. To have this depth of human capital, the JSF program must be modified to be less expensive, and must be procured in conjunction with other less expensive platforms to maintain the country's core competency in strike fighter aviation under the predictive fiscal constraints set out in this research.

Expanded Analysis

The JSF program in its current form envisions 2,458 aircraft at a flyaway cost of $277 billion dollars. These are the last primary source numbers available from analysis done on December 2005 data, found in a March 2007 report. It is the assumption of this research that we will continue to see a trend of shrinking numbers of aircraft, at higher program cost. This chapter will explore other options (as outlined in previous chapters) for other less costly and ultimately more capable future platforms to counter the threats as outlined in the QDR and other strategic documents.

As outlined in this 2005 data, the current flyaway cost per JSF aircraft is 113 million dollars. From other CBO data the Navy plans to spend $7 billion to develop and $77 billion to procure 680 JSFs of both the carrier and STOVL versions. This comes to $124 billion per copy. As stated previously the STOVL version of the JSF is the most costly to produce and develop.

Assume focusing all development dollars toward a single model JSF will cost $7 billion dollars. This is the figure the Navy is currently using for development of the STOVL and carrier version and should be more than adequate for F-35J development. This in turn would save any development dollars the Air Force has budgeted at this time. Additionally, the manufacturers and the Services must be forced to limit the cost of the single version JSF to a realistic number: a flyaway cost of $90 million dollars per aircraft seems reasonable as a maximum. This limit can be met by evaluating what technologies are on track, as compared to what currently exists and doing the best that can be done in the current fiscal environment. As with the Hornet and Falcon, upgrades can be made over the life of the airframe. Other clear cost savings will come from the decrease in the

scope of software to support the three model systems, and by increasing the 70-90 percent commonality to 100 percent. Multiple cost avoidance well beyond the scope of this paper would be achieved by committing to a single model JSF. In realizing these savings, all F-35J JSFs must be interchangeable, and the entire supply chain of the weapons system can be continually managed. Consolidation of training assets, rework and maintenance facilities also are keys in reducing total cost.

Combining the assets and cost of the JSF and Super Hornet across the Navy and Air Force would be the final step in maintaining this core capability for the future. A natural break is to have the Navy as the executive agent (EA) for the FA-18J and the Air Force as the EA for the F-35J. Both Services flying a total of 2500 to 3000 new modern airframes will be the most effective, efficient, and adaptable strike fighter capability for our nation's future. The combination of the JSFs stealth capability in conjunction with the FA-18Js weapons load and cost basis will allow the nation to field a viable adaptable fighter force well into the middle of this century. The most recent purchase of FA-18 J was done at $50 million (2006 dollars) flyaway cost per copy for the basic airframe. Adding an additional 10 million for all needed ancillary equipment puts the combat cost at $60 million per aircraft. Assuming a cost of $90 million for a JSF and $60 million for a Super Hornet a mix of 1500 of each would cost a little less than $225 billion. Add to this any remaining development costs of the single version JSF and cost of system upgrades and integration to the Super Hornet, and the bill remains well under $270 billion for much more depth and capability than is found in the current JSF program. Again these are "order of magnitude" estimates, and much refinement must be done.

However, maintaining an affordable core competency with capability for expansion is a must if we are to defend the homeland in depth.

The goal is to have a military force that can deter, and if necessary, defeat and destroy any nation that chooses major combat against the United States. However, we must produce this force while considering the cost to our nation, competing national priorities and our nation's total power.

The U.S. can be expected to constantly hedge against those who will seek asymmetric advantages. If as a nation we focus our resources too tightly on our current planning, we may continue to be countered by an enemy that avoids those capabilities for opportunities in other areas of U.S. vulnerability. Thus we must prudently scale our strike fighter program for the likely future budget reality. We can maintain this advantage while placing as much as $50 billion dollars in fly away cost and so much more in total system cost back into the entire system for capabilities in other defense areas to aid in the defense of the homeland in depth.

Conclusion

The thesis of this paper is as follows: Given that the time period following Operation Iraqi Freedom (OIF and OEF) will require the recapitalization of the force under zero growth in military spending a restructured joint fighter force can serve as a model of unexpected affordability. This research has shown a cyclical pattern when assessing the nation's willingness to spend on defense. During the inter-war years following Vietnam, military spending in relation to GDP decreased by 40 percent and post Cold War/Gulf War One 37 percent.[43] The forecast budget beginning 2010 predicts a 17 percent decrease of the baseline budget with the likelihood that Global War on Terrorism supplemental will be gone.[44] It has shown that when measured against real dollars, the budget for the years following OIF will remain flat, and when measured against GDP will be in a range between 3.0 percent and 3.5 percent of GDP.

The research has shown the current strategic documents are vague, broad conflicting, and do not directly prioritize needed capabilities. These conditions serve only to exacerbate efforts to defend the U.S. and the free world from a wide spectrum of serious, major threats.

The Services attempt to operationalize this vague strategic guidance, and in process they attempt to do everything that they interpret is called for in the guidance. They continue to program under the existing paradigm growing a traditional AirLand battle force when the current environment calls for something else. This programming is done using unrealistic budget assumptions and when a program runs over cost, money is

[43] Congressional Budget Office, "The Budget For Fiscal Year 2008" , Historical Tables, 46-54
[44] Ibid. 54

moved from other programs ultimately making the process less efficient driving up the cost of everything.

Under future acquisition budget conditions, this way of doing business will exaggerate the inefficiencies of the system. These practices, if not modified, are the proven way to a hollow force. Concurrently, a force that is not capable or adaptable for the future not yet known. This produces a military not as capable of meeting U.S. defense needs, and emboldens those who threaten U.S. security and the security of allies.

The research has suggested that more so than any other time, under a zero growth budget, the need for focused strategic guidance is required. It further suggested that the strategic focus needs to make defending the homeland in depth the prime directive of our strategic guidance. This clear guidance would allow the Services to program unambiguously. This would produce several benefits in how the Services' program and how the Congress affects programming. Further, it would help with the complicated process of manning, training and equipping for an unknown future. AirLand Battle was used as a good example of clear guidance that was designed into a methodology that could help all Services to better plan, program and budget.

Interdependence among the Services and Combatant Commands is a current, accepted concept in the U.S. defense establishment. The JSF is an example of how a program can meet strategic priorities while covering individual Service needs with a combat system to fulfill their core competency. The solution as presented in Chapter 6 exemplifies the art of the possible under the likely constrained budget. This self restraint, if exercised by the DoD, can obviate the need for Congress to micromanage the DoD, because it fulfills strategic requirements prudently. This change in the strike fighter

programming is an example of how all major weapons systems need to be examined and can be modified under a fiscally constrained, refined strategic priority.

With a refined strategic priority, understanding of budget realities, and applying a joint framework, the Services will be positioned best to meet their requirements to defend our homeland in depth.

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